EOSDIS Core System Project

Interface Control Document Between EOSDIS Core System (ECS) and the Alaska SAR (Synthetic Aperture Radar) Facility (ASF) Distributed Active Archive Center (DAAC) for the ECS Project

This document has not yet been approved by the Government for general use or distribution.

Preliminary

March 1996

Hughes Information Technology Systems
Upper Marlboro, Maryland

Interface Control Document Between EOSDIS Core System (ECS) and the Alaska SAR (Synthetic Aperture Radar) Facility (ASF) Distributed Active Archive Center (DAAC) for the ECS Project

Preliminary

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APPROVED BY

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Preface

This document is a formal contract deliverable with an approval code 2. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

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Abstract

This Interface Control Document (ICD) defines the functional and physical design of each interface between ECS and the ASF DAAC-Unique System and includes data contents and format for each interface. The modes (options) of data exchange for each interface are described as well as the conditions required for each mode or option. Additionally, data rates, frequencies, file sizes, error conditions, and error handling procedures are included or a place holder has been inserted for updating as the information becomes available. The sequence of exchanges is described, as are the details for communications protocols or physical media for each interface.

This ICD is consistent with the external systems interface requirements at the ASF DAAC, as described in the Earth Science Data and Information System (ESDIS) Project -- Level-2 Requirements, the Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS Level-3 requirements) and the Interface Requirements Document (IRD) Between ECS and the Version-0 System.

Keywords: ASF, ancillary, DCE, API, metadata, products, SAR, RADARSAT, ERS, JERS, Kftp, DAN, DAA, DDN, DDA

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Abbreviations and Acronyms

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1. Introduction

1.1 Identification

This Interface Control Document (ICD), Contract Data Requirements List (CDRL) Item 029 whose requirements are specified in Data Item Description (DID) 209/SE1, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

1.2 Scope

This Interface Control Document (ICD) defines the external interfaces (i.e., between ECS and non-ECS components) within the Alaska SAR Facility (ASF) Distributed Active Archive Center (DAAC) Unique System for the Release B.

ECS Releases are keyed to ECS mission support: Release IR-1 provides support to TRMM Early Interface Testing and Science Algorithm I&T. Release A provides support to TRMM Science Operations and TRMM Ground Systems Certification Testing. Release A also provides the functional capabilities needed to support early ESDIS Ground System Testing for the EOS AM-1 and Landsat 7 missions. Release B provides support to EOS AM-1 Mission Operations and Science Operations, and it provides support to ESDIS Ground System Certification Testing for the EOS AM-1 and Landsat 7 missions. Release B also provides archive and distribution services for the Landsat 7 mission. In addition, support is provided for the international missions at the ASF DAAC consisting of ERS-1, ERS-2, JERS-1 and RADARSAT. Releases C & D provide evolutionary enhancements to the ECS services provided in the earlier Releases.

This ICD does not address:

   a. Data flows for V0-to-V1 data migration ---these data flows are fully addressed in the Version 1 Data Migration Plan White Paper, 1/95.

   b. Version 0 catalog interoperability data flows; these are included in the Interface Control Document Between the EOSDIS Core System (ECS) and the Version 0 System.

The Earth Science Data and Information System (ESDIS) Project has responsibility for the development and maintenance of this ICD. Any changes in the interface requirements must be agreed to, and assessed at the ESDIS Project Level. This ICD will be approved under the signature of the ESDIS Project Manager.

This document reflects the technical baseline maintained by the ECS Configuration Control Board in accordance with ECS technical direction (see Section 2.2).

1.3   Purpose and Objectives

This document is written to formalize the interpretation and general understanding of the interfaces between ECS and non-ECS components of the ASF DAAC-Unique System. This document is intended to provide clarification and elaboration of the ECS/non-ECS systems interfaces at the ASF DAAC to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system.

This document provides a point of mutual control of external interface behavior definitions via the ESDIS Configuration Control Board (CCB).

1.4   Status and Schedule

This ICD evolves as the ECS design and ASF DAAC-Unique System design progress. This is a Preliminary ICD for the ECS/non-ECS systems interfaces at the ASF DAAC. The ASF DAAC-Unique System is currently under development by staff at the Jet Propulsion Laboratory (JPL), and therefore specific designs and implementations are in work. This system includes many of the functions that will be replaced by ECS Release B implementation. Deliveries of major subsystems by JPL were planned for November 1995, March 1996, June 1996, November 1996 and October 1997. This scheduled is currently being revised.

In its final form, this ICD will be submitted as a Configuration Control Board (CCB) approval Code 1 document. At the Government's option, this document may be designated to be under full Government CCB control. Changes may be submitted for consideration by Contractor and Government CCBs under the normal change process at any time.

Within this document are some interfaces that are yet To Be Determined (TBD), To Be Resolved (TBR), and/or To Be Supplied (TBS) items. A Work-Off Plan is included in an Appendix A for resolving these items. This plan provides the following information:

  a. ICD I/F Issue Number

  b. ICD Reference Paragraph

  c. ICD Issue Priority

  d. ICD Issue Type - Description

  e. Work-off Plan Task(s)

  f. Projected Resolution Date

  g. Risk Assessment

1.5   Organization

This document is organized in 5 sections:

  a. Section 1 provides information regarding the identification, scope, purpose and objectives, and organization of this document.

b. Section 2 contains information about documentation relevant to this ICD, including parent, applicable, and information documents.

c. Section 3 provides an overview of the interfaces, with a brief description of the elements involved.

d. Section 4 provides an overview of the data exchange framework.

e. Section 5 contains a description of each data exchange between the ECS and the ASF DAAC-Unique System, the data transfer method, and descriptions of the data format.

f. Appendix A contains a table which identifies a Work-off Plan for all TBRs, TBSs and/or TBDs.

g. A list of abbreviations and acronyms.

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2. Related Documents

2.1   Parent Documents

The following are parent documents from which this document's scope and content derive:

193-208-SE1-001   Methodology for Definition of External Interfaces for the ECS Project

301-CD-002-003   System Implementation Plan for the ECS Project

423-10-01-5   Goddard Space Flight Center, Earth Science Data and Information System (ESDIS) Project Level 2 Requirements, Volume 5: EOSDIS Version 0; through CH-01, 9/13/93

423-41-01   Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work, through CN-14, 4/25/95

423-41-02   Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Revision A through CH-06, 4/25/95

505-10-20   Goddard Space Flight Center, System Interface Control Plan for the Earth Science Data and Information System (ESDIS) Project

505-41-11   Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and the Version 0 System, 10/95

2.2   Applicable Documents

The following documents are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this ICD, this document shall take precedence. Please note that Internet links cannot be guaranteed for accuracy or currency.

206-CD-001-002   Version 0 Analysis Report for the ECS Project

305-CD-008-001   Release A SDPS Data Server Subsystem Design Specification for the ECS Project

305-CD-009-001   Release A SDPS Ingest Subsystem Design Specification for the ECS Project

305-CD-012-001   Release A CSMS Segment Communications Subsystem Design Specification for the ECS Project

305-CD-024-002	Release B SDPS Data Server Subsystem Design Specification for the ECS Project
305-CD-025-002	Release B SDPS Ingest Subsystem Design Specification for the ECS Project
305-CD-029-002	Release B CSMS System Management Subsystem Design Specification for the ECS Project
313-CD-004-001	Release A CSMS/SDPS Internal Interface Control Document for the ECS Project
313-CD-006-002	Release B SDPS/CSMS Internal Interface Control Document for the ECS Project
819-RD-001-001	EODIS Core System (ECS) Application Programming Interface (API) Interface Definition Document (IDD)
160-TP-002-001	Version 1 Data Migration Plan [for the ECS Project], Technical Paper
175-WP-001-001	HDF-EOS Primer for Version 1 EOSDIS (White Paper for the ECS Project)
210-TP-001-006	Technical Baseline for the ECS Project, 2/14/96
none	Goddard Space Flight Center, ECS Technical Direction No. 11, "PDR Technical Baseline," 12/6/94
none	Goddard Space Flight Center, Science Data Plan for the EOS Data and Information System Covering EOSDIS Version 0 and Beyond, Document Version 3, 7/94
none	Goddard Space Flight Center, EBnet-Distributed Active Archive Center (DAAC) Interface Control Document
CCSDS 301.0-B-2	Consultative Committee for Space Data Systems (CCSDS), Time Code Formats, Blue Book, Issue 2
CCSDS 620.0-B-2	Consultative Committee for Space Data Systems (CCSDS), Standard Formatted Data Units -- Structure and Construction Rules, Blue Book
CCSDS 641.0-B-1	Consultative Committee for Space Data Systems (CCSDS), Parameter Value Language Specification (CCSD0006), Blue Book
RFC 791	Internet Protocol, J. Postel (WWW access: gopher://ds.internic.net:70/)
RFC 793	Transmission Control Protocol, J. Postel (WWW access: gopher://ds.internic.net:70/)
RFC 821	Simple Mail Transfer Protocol (SMTP) (WWW access: gopher://ds.internic.net:70/)

RFC 959   File Transfer Protocol, Internet Standards, J. Postel, J. Reynolds
                            (WWW access: gopher://ds.internic.net:70/)

RFC 1157   A Simple Network Management Protocol (SNMP), J. Case, M. Fedor,
                            M. Schoffstall, J. Davin (WWW access: gopher://ds.internic.net:70/)

RFC 1510   The Kerberos Network Authentication Service (V5), J. Kohl and B.
                            Neuman (WWW access: gopher://ds.internic.net:70/)

2.3   Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document, but are not binding.

604-CD-001-004   Operations Concept for the ECS Project: Part 1-- ECS Overview

604-CD-002-003   Operations Concept for the ECS project: Part 2B -- ECS Release B

CP-IMS   Jet Propulsion Laboratory, Control Processor (CP) and Information
                          Management Subsystem (IMS) System Interface Specification Version
                          1.0, Chapter 3

JPL D-12726 ASF R1B   Jet Propulsion Laboratory, Production Planning Subsystem (PPS) and
                          Information Management Subsystem (IMS) Interface Specification,
                          Chapter 9

JPL D-12726   Jet Propulsion Laboratory, Alaska SAR Facility (ASF) Product
                          Verification Subsystem R1B Interface Specification, July 1995

JPL-D-12726 ASF R1B   Jet Propulsion Laboratory, Flight Agency Interface Function (FAIF) and
                          Information Management Subsystem Interface Specification, Chapter 9

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3. Interface Overview

The primary activity of the Alaska SAR Facility DAAC is to process, archive, and distribute Synthetic Aperture Radar (SAR) data, to support the user community, and to receive X-band direct downlink data from a variety of satellites. The SAR instruments that are currently operational are on the following satellites: European Space Agency (ESA) European Remote-Sensing Satellite (ERS–1) launched in July 1991 and the Japanese Earth Resource Satellite (JERS–1) launched in February 1992. Additional data will be obtained from the Canadian RADARSAT and the ESA ERS–2.

3.1 ECS - ASF DAAC-Unique System Interfaces

The ECS support for the SAR science data is collocated with the ASF DAAC-Unique System at the ASF. Figure 3.1 provides a top-level view of the functional interfaces between the ECS and the ASF DAAC-Unique System. The ECS - ASF DAAC-Unique System data exchange and user access are supported by communication/networking services through ECS, the EOSDIS Backbone Network (EBnet) and the Internet. This ICD addresses only the interfaces between ECS and the ASF DAAC-Unique System.

The interfaces between the ECS and the ASF DAAC-Unique System are accomplished through the use of ECS standard Application Programming Interfaces (API). These APIs permit development of DAAC-Unique value added services. The EODIS Core System (ECS) Application Programming Interface (API) Interface Definition Document (IDD) provides an explanation of the prerequisites necessary before a user can successfully invoke APIs within an application program. The API IDD will cover the following: the knowledge that is necessary in order to write the code which calls these capabilities, the ECS architecture, the key mechanisms within ECS, integration and testing requirements, required software libraries, the administrative path to follow to gain approval to call the ECS APIs for a particular application, and the process by which the new application program may be advertised for use by others. The ECS and ASF DAAC-Unique System work together to provide user access, production planning, production processing, data archive and product distribution functions for the data and products from the ASF's SAR instruments.
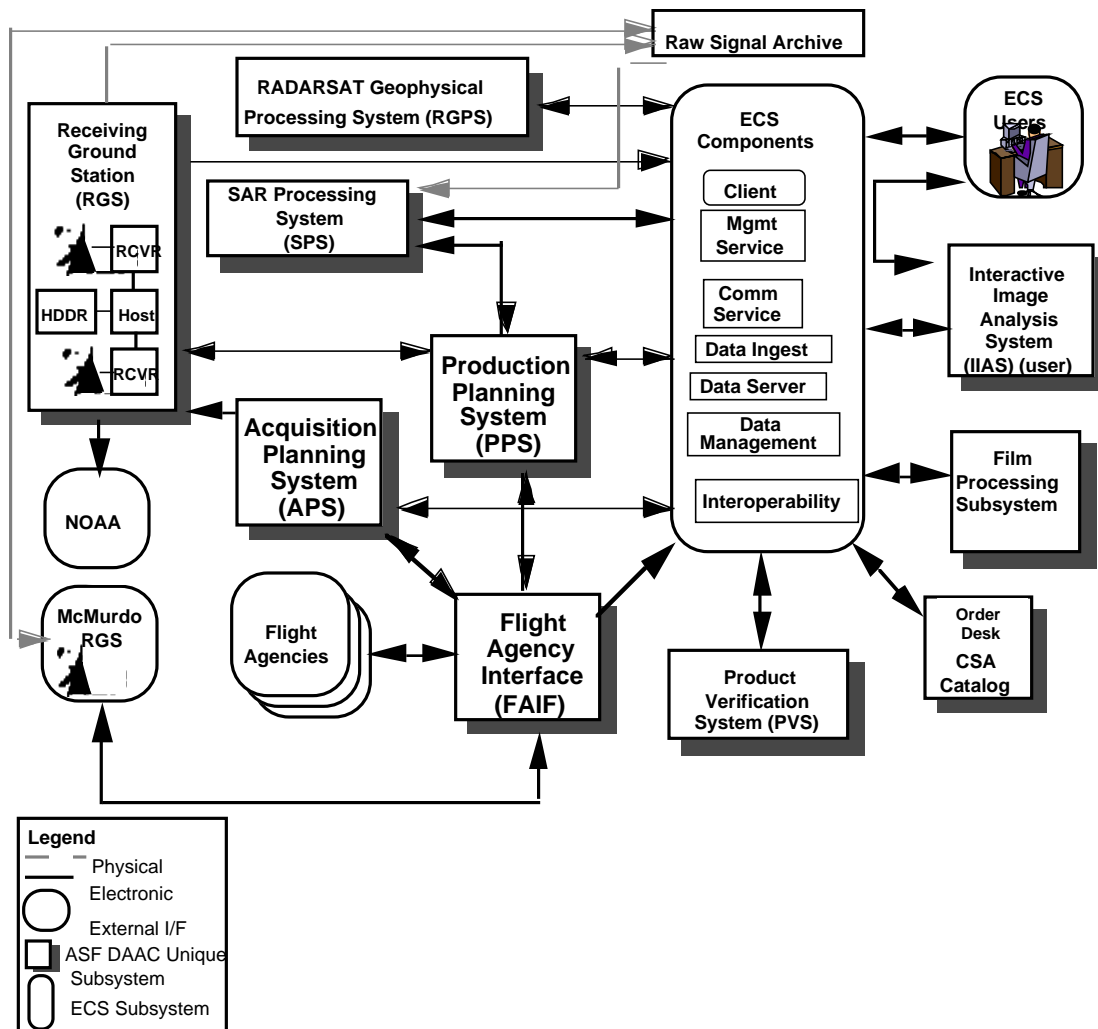
Figure 3-1. ECS - ASF DAAC-Unique System Functional Interfaces

The ASF DAAC-Unique System is responsible for performing planning functions with the Foreign Flight Agencies (FFAs), receiving and archiving the SAR raw signal data and processing the signal data in response to user orders. The ASF DAAC-Unique System includes several subsystems. The ASF DAAC-Unique subsystems that exchange data and information with ECS are defined as follows:

a. Receiving Ground Station (RGS) - Track X and S band signals, acquire X band telemetry and manage signal tape generation (Note: This includes generation of signal data tape copies for users.)

b. RGPS Derived Product Subsystem (RDPS) - Produce upper level geophysical products.

c. SAR Processing Subsystem (SPS) - Scan signal data, reformat raw signal data for processing, produce standard and quick look SAR image and signal data products, provide product histories and provide for operator image quality assurance.

d. Acquisition Planning Subsystem (APS) - Manage user acquisition requests, manage ASF antenna resources, generate flight agency requests, generate daily reception activity schedules and perform spacecraft and antenna conflict resolution.

e. Production Planning Subsystem (PPS) - Keep track of unfilled processing requests, prioritize requests, determine which requests can be filled and dispatch requests to the processors.

f. Flight Agency Interface Function (FAIF) - Insulate ASF system from Flight Agencies (ERS, JERS & RADARSAT) unique formats and interface mechanisms.

g. Product Verification Subsystem (PVS) - Processor validation, calibration and product troubleshooting.

h. Film Processing Subsystem (FPS) - Generates wet and dry chemical photo materials from digital SAR imagery in support of user requests.

i. Interactive Image Analysis System (IIAS) - Tool development, product development, science user support and ingest ancillary data.

The ECS is responsible for maintaining a catalog of ASF data, receiving and managing user orders and archiving higher level products and ancillary data. To support this, ECS fields the complete suite of Communications and Systems Management Segment (CSMS) subsystems at the ASF along with the following Science Data Processing Segment (SDPS) subsystems: Client, Interoperability, Data Management, Data Server, and Data Ingest. ECS does not provide the ASF DAAC with the ECS Processing and Planning Subsystems.

The following list provides an overview of the ECS provided functions:

a. Catalog SAR Raw Signal Metadata , Level 1 - 3 Product Metadata, Film Metadata, Quicklook Metadata

b. Archive Level 1-3 Products, ancillary data and Quicklook data*

c. Distribute data products (including film media and Quicklook) - electronically and physically

d. Receive and manage orders and order information (including restricting access to ASF products)

e. Perform financial accounting and billing

f. Perform statistical and accountability reporting

g. Provide one-way interoperability with the CSA catalog - (ECS users query CSA catalog)

*Quicklook data is both low and full resolution Level 1 products that are processed using predicted spacecraft ephemeris data (location, orientation, rotation rates, etc.) with spacecraft data.

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4. Data Exchange Framework

Section 4 describes the data exchange framework supporting the ECS - ASF DAAC-Unique System interfaces presented in Section 3.1. The descriptions include network topologies, internetworking protocols, electronic data exchange, data exchange interfaces, physical media data exchange, data exchange formats and data exchange security. Specific characteristics of each ECS-ASF DAAC-Unique System data flow supported by the framework are provided in Section 5.

4.1 Internetworking Protocols

The ECS-ASF DAAC-Unique physical communication links are supported by internetworking services that are consistent with the Open Systems Interconnection (OSI) reference model, as defined in the International Organization for Standardization, Basic Reference Model of Systems Interconnection (ISO 7498). These services are also described in "Internet Programming; Jamsa Press, Nevada, 1995". Connection-oriented services are provided using the TCP/IP protocol suite [Transmission Control Protocol/Internet Protocol].

4.1.1 Datalink/Physical Protocol - Network Topology

ECS interfaces to the ASF DAAC-Unique System through two interfaces. One interface is FDDI and connects ECS to the ASF FDDI Production Network. A second Ethernet interface is used to connect to V0 hosts (for the purpose of V0 migration only), as well as to some ASF DAAC hosts that are currently connected to the ASF campus Ethernet network. This configuration is depicted in Figure 4-1.

4.1.2 Internet Protocol (IP)

The Internet Protocol (IP), specified in RFC 791, supports network layer data exchanges between the ECS and the ASF DAAC-Unique System elements. The network layer provides the transparent transfer of data between transport entities. The IP addresses for the network nodes and data hosts are determined by the time of installation at ASF.

4.1.3 Transmission Control Protocol (TCP)

Connection-oriented transport service is implemented using TCP. TCP, specified in RFC 793, is a connection-oriented, end-to-end reliable protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. It provides for guaranteed delivery of data between pairs of processors in host computers attached to networks within and outside ECS.

The interface between TCP and an application process consists of a set of calls much like the calls an operating system provides to an application process for manipulating files. For example, there are calls to open and close connections and to send and receive data on established connections.
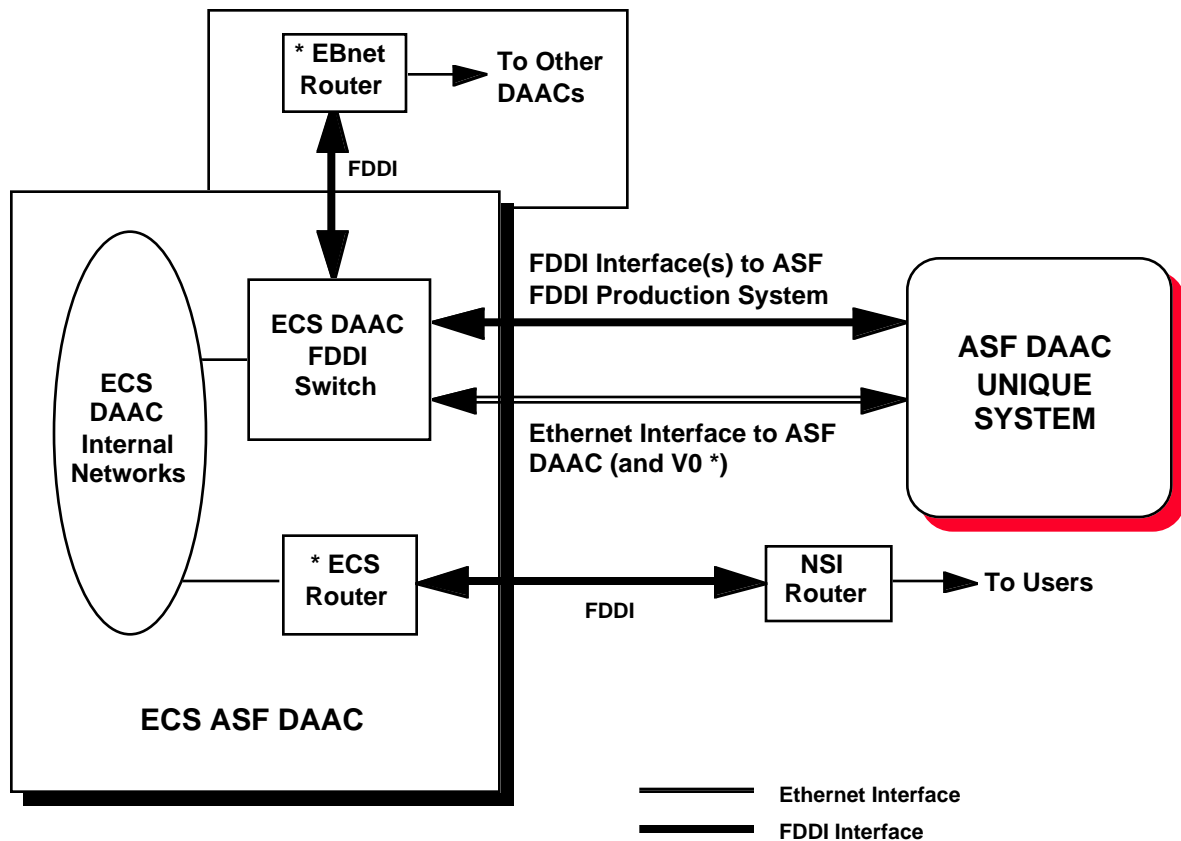
Figure 4-1. ECS -ASF DAAC Unique System Network Topology

4.1.4 Applications Protocols

ECS provided application protocols in the TCP/IP protocol suite are defined in the following paragraphs.

4.1.4.1 Simple Mail Transfer Protocol (SMTP)

All electronic mail (e-mail) message exchange is accomplished through the use of Internet e-mail messages. The protocol for Internet e-mail transfer is the Simple Mail Transfer Protocol (SMTP). SMTP is defined in RFC 821.

4.1.4.2 Simple Network Management Protocol (SNMP)

The communication of management information between ECS and the ASF DAAC-Unique System uses the Simple Network Management Protocol (SNMP). SNMP is concerned with management of all the communications protocols within each host and the various items of networking equipment that provide these services. SNMP is defined in RFC1157. ECS provided APIs to support this protocol will be provided in the final version of this document.

4.1.4.3 Kerberos File Transfer Protocol (Kftp)

Ancillary data, metadata and SAR raw signal metadata file transfers between ECS and the ASF DAAC-Unique System host computers are accomplished through the use of Kerberos File Transfer Protocol (Kftp) Kerberos Version 5 is described in RFC1510 and is a security application that can be applied to any transfer protocol. The Kftp provides the same functionality as standard ftp but has an added layer for Kerberos authentication.

ECS and interfacing ASF DAAC-Unique System supporting Kftp transfer must both host Kerberos software. The ECS side of the interface provides the required Kerberos key server function.

4.2 Distributed Computing Environment (DCE)

ECS supports the Open System Foundation's (OSF) DCE services consisting of multiple components which have been integrated to work closely together. They are the Remote Procedure Call (RPC), the Cell and Global Directory Services (CDS and GDS), the Security Service, DCE Threads, Distributed Time Service (DTS),and Distributed File Service (DFS). The Threads, RPC, CDS, Security, and DTS components are commonly referred to as the "secure core" and are the required components of any DCE installation. DFS is an optional component. DCE also includes administration tools to manage these components.

DCE services support intra-cell communications (within ECS) and inter-cell communications (between ECS and external data providers). DCE Security Services make use of configuration-controlled Access Control Lists (ACLs) and Kerberos authentication tools to maintain this security.

4.3 Data Exchange Between ECS and ASF DAAC-Unique System

4.3.1 Application Programming Interfaces (APIs)

Data exchanges that occur between the ECS and the ASF DAAC-Unique System are through the use of standard ECS provided APIs. These APIs permit development of DAAC-Unique value added services. The EOSDIS Core System (ECS) Application Programming Interface (API) Interface Definition Document (IDD) provides an explanation of the prerequisites necessary before a user can successfully invoke APIs within an application program

4.3.2 Handshake Control Messages and File Transfer Sequences

Initiation and completion of data transfer requires automated transmission of handshake control messages, or domain messages, between ECS and ASF DAAC-Unique System. These messages, which are based on the Sensor Data Processing Facility (SDPF) CBI Get Protocol, are transferred between the ASF DAAC-Unique System and ECS via OODCE RPC calls. Table 4-1 lists the messages involved before and after an electronic file transfer. These messages are defined in Sections 4.3.2.1 through 4.3.2.2.4.

Table 4-1. Handshake Control Messages

Message Name	Purpose	Description	Sender
Data Availability Notice (DAN)	Notification of Data Ready for Transfer	System with data notifies Consumer system that the data are staged and ready for transfer.	ASF
Data Availability Acknowledgment (DAA)	DAN Handshake	Consumer system acknowledges that the DAN has been received, and notifies of any DAN errors	ECS
Data Delivery Notice (DDN)	Notification of Data Transfer	Consumer system notifies that data has been transferred, ingested and archived; includes identification of data retrieval success and/or problems	ECS
Data Delivery Acknowledgment (DDA)	DDN Handshake	System with data notifies Consumer system that the DDN has been received, which indicates that the data can be deleted from the staging area	ASF

4.3.2.1 ECS Retrieves Data from ASF DAAC-Unique System to Archive

The sequence of handshake control messages and file transfers needed for ECS to retrieve data from ASF DAAC-Unique System is illustrated in Figure 4-2.

ASF DAAC-Unique System sends a Data Availability Notice (DAN) message to ECS, specifying the names of the data files, file sizes, file dates and times, number of files, and file locations for the files available for ECS to archive. ECS validates the DAN, and sends the corresponding handshake control message, the Data Availability Acknowledgment (DAA), which reports the disposition of the DAN.

When ready, ECS begins the Kftp file transfer process, and transfers all the files in each error-free file group listed in the DAN. Each file is verified, by checking its name and size against DAN information; the data is extracted; and the file transfer result is logged in the Data Delivery Notice (DDN). After all the files have been transferred, ingested, and archived or when all attempts have been exhausted, ECS sends ASF DAAC-Unique System a DDN to the same IP address that sent the DAN, notifying whether files were successfully archived and/or identifying errors associated with individual files for a particular DAN. Only complete file groups that are transferred without error are ingested and archived. ASF DAAC-Unique System responds with the corresponding handshake control message, the Data Delivery Acknowledgment (DDA). In the case of failure in file transfer and archive, due to an error in the DAN, ASF DAAC-Unique System sends a new DAN when the error has been corrected. If there is a network failure during or before file transfer, ECS retries later and does not require ASF DAAC-Unique System to retransmit the DAN in this case.

Files that have been successfully archived within ECS are eligible for deletion at ASF DAAC-Unique System.

In the event of a problem in file transfers (Kftp), data transfer attempts may be repeated an operations-tunable number of times by the automated system before the operator is notified. However, if the problem cannot be resolved within a mutually agreed upon time frame, ECS and ASF DAAC-Unique System operations personnel have the option to coordinate data delivery on standard ECS-supported 8 mm tape (**TBD**) ingest media.

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ASF   **ECS**

<OODCE RPC CALLS >

Data Availability Notice

Data Availiability Acknowledgement

< Kftp daemon >

D
A
T
A

get

H
O
S
T

Data File

<OODCE RPC CALLS >

Data Delivery Notice

Data Delivery Acknowledgement

— — — Messages

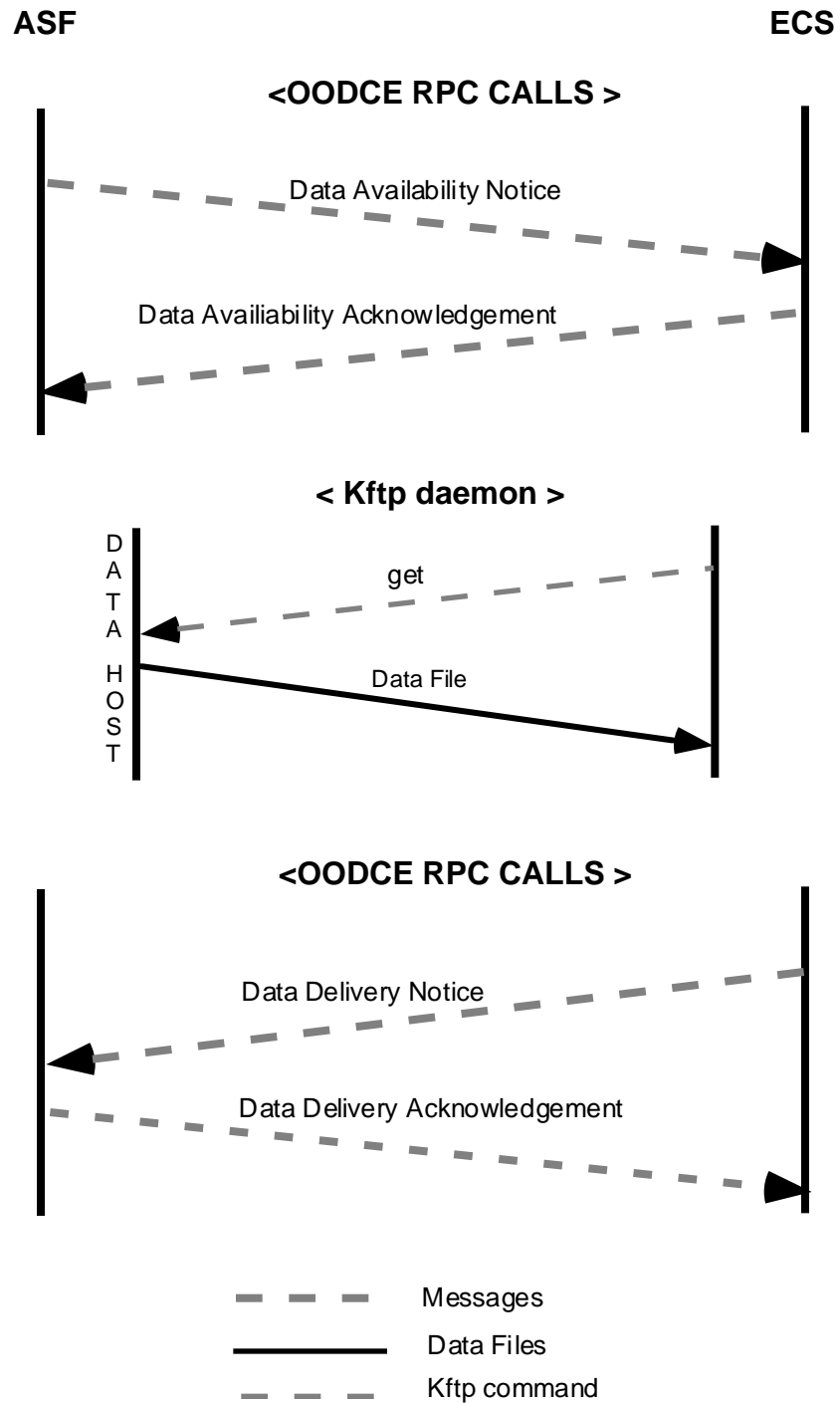———— Data Files

— — — Kftp command

Figure 4-2. ECS Retrieves Data from ASF DAAC-Unique System

4.3.2.2 Message Format and Contents Overview

The control messages are identified in Table 4-1. The message formats are subsequently detailed and contain both fixed and variable length strings. A zero byte (NULL character) is used as a field separator for variable length strings in the manner of the C programming language, except in the Parameter Value Language (PVL) as noted in Section 4.3.2.2.1. Field lengths are specified in terms of bytes, where a byte is equal to 8 bits. The specified field lengths do not include the null character used to terminate variable length strings. The Message Type and Message Length fields comprise the Message Header.

A control message is rejected when it contains errors or is sent in an inappropriate sequence. The message source receives notification of this rejection, via a control message from the message destination. Error conditions for each of the messages include out-of-bound parameter values, invalid parameter values, and missing parameter values (e.g., message type). In most cases, the message is corrected by the message source, and resent.

The message transfer scenario between ASF and ECS supports operator tunable parameters, which are included in the operations procedures for ASF and ECS at the ASF DAAC, which are documented in the DAAC Operators Manual (DID 611). Operator tunable parameters include:

- Time either system waits for a message acknowledgment before resending a message.

- Time between sending a DAN and the time the data will be deleted from the file server if it has not been retrieved.

4.3.2.2.1 Data Availability Notice (DAN)

A DAN message is sent by the system supplying the data (ASF DAAC-Unique System processor) to the Consumer System (system that receives the data) to announce the availability of data for transfer. It specifies the parameters needed to identify what files are ready for pickup, their location, and how long they will be available in that location. The maximum message length allowed for a DAN sent between ASF DAAC-Unique System and ECS is 1 megabyte (1,048,576 bytes).

Figure 4-3 shows the DAN message structure. Each DAN includes a Message Header, Exchange Data Unit (EDU) Label, a DAN Label and Parameter Value Language (PVL) Statements. The Message Header and labels are in a contiguous string, followed by the PVL. The labels and PVL statements are in Standard Formatted Data Unit (SFDU) format. (More information about SFDU and PVL can be found in the documents Consultative Committee for Space Data Systems (CCSDS), Standard Formatted Data Units -- Structure and Construction Rules, Blue Book, and Consultative Committee for Space Data Systems (CCSDS), Parameter Value Language Specification (CCSD0006), Blue Book.)

Table 4-2 contains the Message Header and SFDU labels which consist of a Exchange Data Unit (EDU) label and a DAN label; Table 4-3 specifies the required parameters in the DAN PVL and their values, for DANs from ASF DAAC-Unique System to ECS (where the Consumer System is ECS).
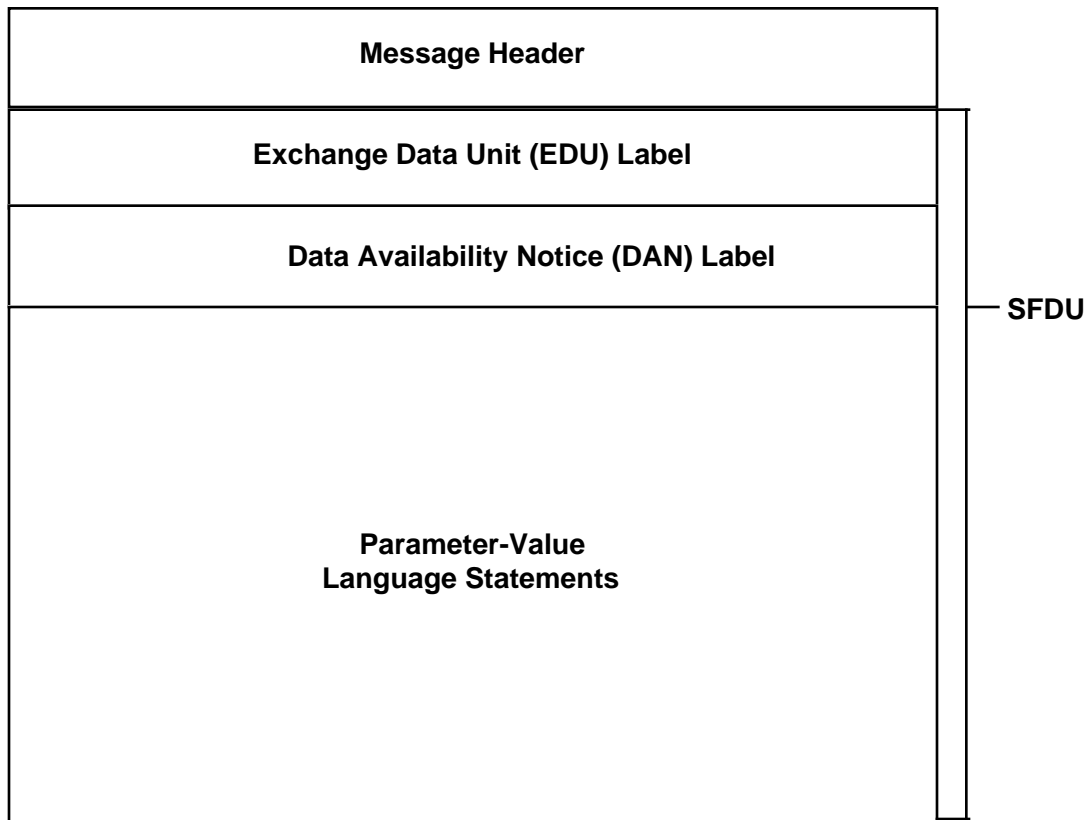
Figure 4-3. DAN Message Structure

Table 4-2. DAN Message Header, and EDU and DAN Labels

Field	Description	Type (Length in Bytes)	Value
Message Type	indicates DAN	Unsigned Integer (1)	1
Message Length	Length of Message in bytes	Unsigned Integer (3)	< 1,048,576
Exchange Data Unit Label	Not used	ASCII (20)	20 byte fill
DAN Label	Not used	ASCII (20)	20 byte fill

The DAN PVL statements are ASCII strings, each string having at most 256 characters, in the form of: "Parameter = Value;". The semi-colon at the end of each statement serves as the field delimiter. A carriage return (\n) may also be added after the semi-colon, for human readability, but is not required. The string values shown in Table 4-3 include pre-defined ASCII values indicated in the table by single quote marks, and a description or range of processor determined values without quotes. These quotes are not used in the actual messages. Processor determined values include ASCII alphanumerics, ASCII numerics, and International Standards Organization

(ISO) times to be filled in with the proper values by the originating system's processor during DAN creation. (ISO format is described in Consultative Committee for Space Data Systems (CCSDS), Time Code Formats, Blue Book.) Comments in the actual PVL, if included, are enclosed in delimiters as follows: /*...comment...*/. The combination of the DAN sequence number and originating system (processor identifier) parameters uniquely identify each DAN and provides the link between related DAN, DAA, DDN and DDA. The FILE_SPEC and FILE_GROUP objects are repeatable within a single DAN, for multiple files and/or file groups. The TOTAL_FILE_COUNT parameter indicates the number of files staged for retrieval. Sample PVL for a DAN sent from ASF DAAC-Unique System to ECS is shown in Figure 4-4. DANs are validated to check that all required fields are present and that the format of the message is correct and consistent with the standards. DANs that adhere to the defined message standards shown in Tables 4-2 and 4-3 are accepted and processed. If an entire DAN is determined to be invalid (e.g. bad DAN Sequence Number) as reflected in the corresponding short DAA, none of its file groups are processed and none of the files are transferred. If a DAN contains multiple file groups for which one or more file groups contain DAN validation errors, the DAN is rejected and not processed; a long DAA is returned describing the disposition of each file group with errors. In either case, the entire DAN must then be retransmitted, with the errors corrected, and with a new sequence number. A separate DAA is sent for each DAN.

Table 4-3. Required PVL Parameters (1 of 2)

Parameter	Description	Type / Format (Maximum Length in Bytes)	Value
ORIGINATING_SYSTEM	Originator of DAN	Variable String / ASCII (20)	ASF DAAC-Unique System (Note 1)
CONSUMER_SYSTEM	Destination of DAN	Variable String / ASCII (20)	ECS (Note 1)
DAN_SEQ_NO	Sequence number assigned by originating system	Unsigned 32-bit Integer / ASCII (10)	$< 4.295 \times 10^9$
TOTAL_FILE_COUNT	Total number of files to transfer	Unsigned Integer / ASCII (4)	1 - 9999
AGGREGATE_LENGTH	Total number of bytes to transfer (sum for all files)	Unsigned 64-bit Integer / ASCII (20)	$< 1.844 \times 10^{19}$
EXPIRATION_TIME	ISO Time for data deletion from originating system	Fixed String / ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ where T and Z are literals (operations tunable amount of time after DAN sent)
OBJECT	Start of file group parameters (repeat for each group of files)	Fixed String / ASCII (10)	'FILE_GROUP'
DATA_TYPE	ECS Data Type	Variable String / ASCII (20)	Valid ECS Data Type

Note 1.   Each processor must have a unique identifier.

Table 4-3. Required PVL Parameters (2 of 2)

Parameter	Description	Type / Format (Maximum Length in Bytes)	Value
DATA_VERSION	Version of Data files	Unsigned Integer ASCII (2)	1 through 99
NODE_NAME	Name of network node on which the file resides	Variable String / ASCII (64)	e.g.. 'servername.asf.alaska.edu'
OBJECT	Start of object describing a Detached SFDU Header File	Fixed String / ASCII (6)	'DP_CIO'
DIRECTORY_ID	File directory name (i.e., path name)	Variable String / ASCII (256) (Note 2)	e.g. /ASF/RAW
FILE_ID	File name	Variable String / ASCII (256) (Note 2)	Detached SFDU header file name
FILE_TYPE	File Data Type	Variable String / ASCII (20)	'METADATA', 'ANCILLARY'
FILE_SIZE	Length of file in bytes	Unsigned 32-bit integer / ASCII (10)	$< 4.295*10^9$
END_OBJECT	End Detached SFDU Header File Group	Fixed String / ASCII (6)	'DP_CIO'
OBJECT	Start of file parameters (repeat for each file)	Fixed String / ASCII (9)	'FILE_SPEC'
DIRECTORY_ID	File directory name (i.e., path name)	Variable String / ASCII (256) (Note 2)	e.g. /ASF/RAW
FILE_ID	File name	Variable String / ASCII (256) (Note 2)	file name
FILE_TYPE	File Data Type	Variable String / ASCII (20)	'METADATA', 'ANCILLARY'
FILE_SIZE	Length of file in bytes	Unsigned 32-bit Integer / ASCII (10)	$< 4.295*10^9$
BEGINNING_DATE/TIME	ISO Start time of data in file as defined in the metadata	Fixed String / ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ where T and Z are literals
ENDING_DATE/TIME	ISO End time of data in file as defined in the metadata	Fixed String / ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ where T and Z are literals
END_OBJECT	End of file parameters (repeat for each file)	Fixed String / ASCII (9)	'FILE_SPEC'
END_OBJECT	End of file group (repeat for each file group)	Fixed String / ASCII (10)	'FILE_GROUP'

Note 2. Size can vary up to 256 bytes total when DIRECTORY_ID is combined with FILE_ID. Size limit excludes the null terminator.

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```
ORIGINATING_SYSTEM = ASF1;
CONSUMER_SYSTEM = ECS_ASF_1;
DAN_SEQ_NO = 5326;
TOTAL_FILE_COUNT = 3;
AGGREGATE_LENGTH = 649678;
EXPIRATION_TIME = 1998-11-12T20:00:00Z;
OBJECT = FILE_GROUP;
        DATA_TYPE = xxxx;
        DATA_VERSION = 1;
        NODE_NAME = servername.asf.alaska.edu;
        OBJECT = DP_CIO;
                DIRECTORY_ID = /ASF1/RAW/;
                FILE_ID = <ASF file name>;
                FILE_TYPE = METADATA;
                FILE_SIZE = 1100;
        END_OBJECT = DP_CIO;
        OBJECT = FILE_SPEC;
        DIRECTORY_ID = /ASF1/RAW/;
                    FILE_ID = <ASF file name>;
                FILE_TYPE = ANCILLARY;
                FILE_SIZE = 242120;
                BEGINNING_DATE/TIME = 1998-11-08T18:36:18Z;
                ENDING_DATE/TIME = 1998-11-08T20:10:07Z;
        END_OBJECT = FILE_SPEC;
END_OBJECT = FILE_GROUP;
OBJECT = FILE_GROUP;
        DATA_TYPE = xxxx;
        DATA_VERSION = 1;
        NODE_NAME = servername.asf.alaska.edu;
        OBJECT = FILE_SPEC;
                DIRECTORY_ID = /ASF1/RAW/;
                    FILE_ID = <ASF file name>;
                FILE_TYPE = METADATA;
                FILE_SIZE = 242120;
                BEGINNING_DATE/TIME = 1998-11-08T18:36:18Z;
                ENDING_DATE/TIME = 1998-11-08T20:10:07Z;
        END_OBJECT = FILE_SPEC;
END_OBJECT = FILE_GROUP;
```

Figure 4-4. Sample DAN PVL

4.3.2.2.2   Data Availability Acknowledgment (DAA)

A DAA message is the corresponding handshake control message for the DAN. The DAA acknowledges receipt of the DAN and provides the mechanism to identify the status of data transfer scheduling and any DAN errors. The status of the DAN is provided in the disposition. Here one of 32 bits is set to 1 to indicate which error occurred. The "Not used" bits are set to 0. The disposition reported in the DAA is where processing of the DAN stopped. A separate DAA is sent for each DAN. The short form of the DAA is used for both error-free DANs and DANs with the same disposition for all files. A long form of the DAA message is used when some file groups in the DAN have invalid parameters. The format and content of the short and long DAA messages are defined in Tables 4-4 and 4-5, respectively.

Table 4-4. Short DAA Message Definition

Field	Description	Type (Length in Bytes)	Value
Message Type	Short Data Availability Acknowledgment	Unsigned Integer (1)	2
Message Length	Length of Message in Bytes	Unsigned Integer (3)	13
DAN Sequence No.	Sequence number assigned by DAN sender	Integer (4)	DAN_SEQ_NO in DAN
Disposition	Disposition Bits -- meaning: Accepted Not used Invalid DAN sequence number Not used Invalid mission ID Not used Invalid file count Not used Other errors Not used Not used Invalid DAN length Invalid aggregate length Database failures Duplicate DAN sequence # Spares	Logical Bits (4)	Bit location set to 1: none 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 31
Transfer Start Time	Not used	Integer (1)	Null

Table 4-5. Long DAA Message

Field	Description	Type (Length in Bytes)	Value
Message Type	Long Data Availability Acknowledgment	Unsigned Integer (1)	3
Message Length	Length of Message in Bytes	Unsigned Integer (3)	Determined length of message in bytes
DAN Sequence No.	Sequence number assigned by DAN sender	Integer (4)	DAN_SEQ_NO in DAN
Number of File Groups (to follow)	Number of File Groups with Errors	Integer (4)	Number of File groups, in DAN, with errors

For each file group having errors in the Data Availability Notice:

Data Type PVL	ECS Data Type	ASCII String (< 20)	DATA_TYPE in DAN
Disposition	Disposition bits -- meaning: Invalid data version Invalid data type Not used Not used Invalid directory Not used Not used Not used Invalid file size field Not used Invalid time/date format Invalid file ID Not used Spare Invalid node name Invalid file type	Logical Bits (2)	Bit location set to 1: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

4.3.2.2.3 Data Delivery Notice (DDN)

A DDN is sent from the system, which has completed retrieving the files via Kftp, to the supplier of the data. The DDN announces the completion of data transfer, preprocessing, and archival, and identifies the success or reason for failure for each file. The short DDN is used for notification of error-free DDNs and DDNs with the same error for all files. Files are processed by file group; therefore, if one or more files encounters a processing error, processing ends for the entire file group. The error incurred is reported in the DDA disposition for each file in the affected file group. If all files in a request do not have the same disposition, a long form of this message is employed. The format and content of the short and long DDN messages are defined in Tables 4-6 and 4-7, respectively.

Table 4-6. Short DDN Message Definition

Field	Description	Type (Length in Bytes)	Value
Message Type	Short DDN	Unsigned Integer (1)	11
Message Length	Length of Message/Bytes	Unsigned Integer (3)	40
DRR Sequence No.	Not used	Integer (4)	0
DAN Sequence No.	Sequence number assigned by DAN sender	Integer (4)	DAN_SEQ_NO parameter in DAN
Disposition	One of the following: Successful Network failure Unable to establish Kftp connection Host denied access All file groups/files not found Kftp failure - Too many errors in file transfer Post-transfer double-check failed Kftp command failure Spares Data provider request threshold exceeded System request threshold exceeded Resource allocation failure Recovery failure Database access error Insufficient number of metadata files Insufficient number of science files Insufficient number of files Data conversion failure Metadata checking failure Unknown data type Indeterminable file type File I/O error Data archive error		 0 1 2 3 4 5 6 7 8 - 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255
Spares		(3)	
Time Stamp	ISO Time of completed data transfer and validation	ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ where T and Z are literals
Throughput	Rate in bytes per second averaged over all files	Integer (4)	>0 (0 indicates unsuccessful transfer)

Table 4-7. Long DDN Message Definition

Field	Description	Type (Length in Bytes)	Value
Message Type	Long Data Delivery Notice	Unsigned Integer (1)	12
Message Length	Length of Message/ Bytes	Unsigned Integer (3)	Determined length
DRR Seq. No.	Not used	Integer (4)	0
DAN Sequence No.	Sequence number assigned by DAN sender	Integer (4)	DAN_SEQ_NO parameter in DAN
Number of Files	Number of Files in DAN	Integer (4)	TOTAL_FILE_COUNT parameter in DAN

For each File in the Data Availability Notice:

Field	Description	Type (Length in Bytes)	Value
File Directory	ASCII string specifying file directory/path name	ASCII (< 256) length of DIRECTORY_ID	DIRECTORY_ID parameter in DAN
File Name	File names on system sending DAN	ASCII (< 256) length of FILE_ID	FILE_ID parameter in DAN
File Transfer Disposition	One of the following: Successful Network failure Unable to establish Kftp connection Host denied access File not found Kftp failure - Too many errors in file transfer Post-transfer double-check failed Kftp command failure Spares Data provider request threshold exceeded System request threshold exceeded Resource allocation failure Recovery failure Database access error Insufficient number of metadata files Insufficient number of science files Insufficient number of files Data conversion failure Metadata checking failure Unknown data type Indeterminable file type File I/O error Data archive error	Integer (1)	0 1 2 3 4 5 6 7 8 - 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255
Time Stamp	ISO Time of completed data transfer and validation	ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ where T and Z are literals
Throughput	Rate in bytes per second for each file	Integer (4)	> 0 (0 indicates unsuccessful transfer)

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4.3.2.2.4   Data Delivery Acknowledgment (DDA)

A DDA is the corresponding handshake control message for the DDN. The DDA provides the mechanism for the supplier of the data (i.e., ORIGINATING_SYSTEM as defined in the DAN PVL) to acknowledge receipt of the DDN. The format and content of the DDA message is defined in Table 4-8.

Table 4-8. DDA Message Definition

Field	Description	Type (Length in Bytes)	Value
Message Type	Short Data Delivery Acknowledgment	Unsigned Integer (1)	17
Message Length	Length of Message in Bytes	Unsigned Integer (3)	33
DRR Sequence No.	Not used	Integer (4)	0
DAN Sequence Number	Sequence number supplied by Originating System	Integer (4)	DAN_SEQ_NO in DAN
Disposition	One of the following: Successful Not used Spares	Integer (1)	0 1 2 - 255
Time Stamp	ISO Time when Consumer System transferred the last part of the data	ASCII (20)	Null

4.3.3   Error Handling/Backup Methods

Should a problem develop during a Kftp file transfer , due to any of the below error conditions, an operator-tunable number of attempts are made to pull the data. In the event that problems cannot be resolved within this operator-tunable number of attempts, on-site ECS operations personnel have the option to coordinate data delivery on approved high density storage media (see section 4.3.5). While the use of tape media as a backup is not a requirement, it may be useful during emergencies, and is supported by ECS and the ASF-Unique System .

In the event that tape media is used during emergencies, a separate Physical Media Delivery Record (PMDR) file must be supplied for each piece of media delivered to ECS. The PMDR must, both, be contained as a file on the media and be available separately as hard copy. In the event that a file check on the media by ECS reveals that the PMDR is missing, DAAC operations personnel will supply ECS operations personnel with a hardcopy PMDR. The format and information content for the PMDR is the same as that for the DAN defined in Tables 4-2 and 4-3 (excluding EXPIRATION_TIME).

4.3.4 Error Conditions

During the course of data exchange via Kftp, the following errors conditions may arise:

- Failure to establish TCP/IP connection

- Erroneous Kftp command

- File Not Found (listed in DAN, but not on disk)

- File Not Readable due to Permissions

4.3.5 Physical Media

The approved high density storage media that will be available at ASF for providing backup during data transfer is 8 mm tape (**TBD**).

Data are distributed on 8 mm tape uncompressed. A block size of 63.5 KB is used, which corresponds to a blocking factor of 127. The TAR and CPIO tape format is supported. The ASF DAAC-Unique System will have the option of choosing one or the other. Paper labels for each tape identify the corresponding DAN sequence number (DAN_SEQ_NO), the names of files contained on the tape, and the order in which these files have been written.

5. Data Flow Descriptions

Figure 5-1 identifies the data flows between ECS and the ASF DAAC-Unique System. These flows are accomplished by electronic data exchanges through the use of ECS provided APIs or by manual methods. Descriptions of the data exchange framework supporting these flows are found in Section 4 of this ICD. Specific characteristics of each electronic data flow shown in Figure 5-1 are described (or assigned place holders for when data is available) in Sections 5.1 through 5.18, including interface methods, data formats, and error handling conditions.

ASF in this section refers to ASF DAAC-Unique System unless specified otherwise.
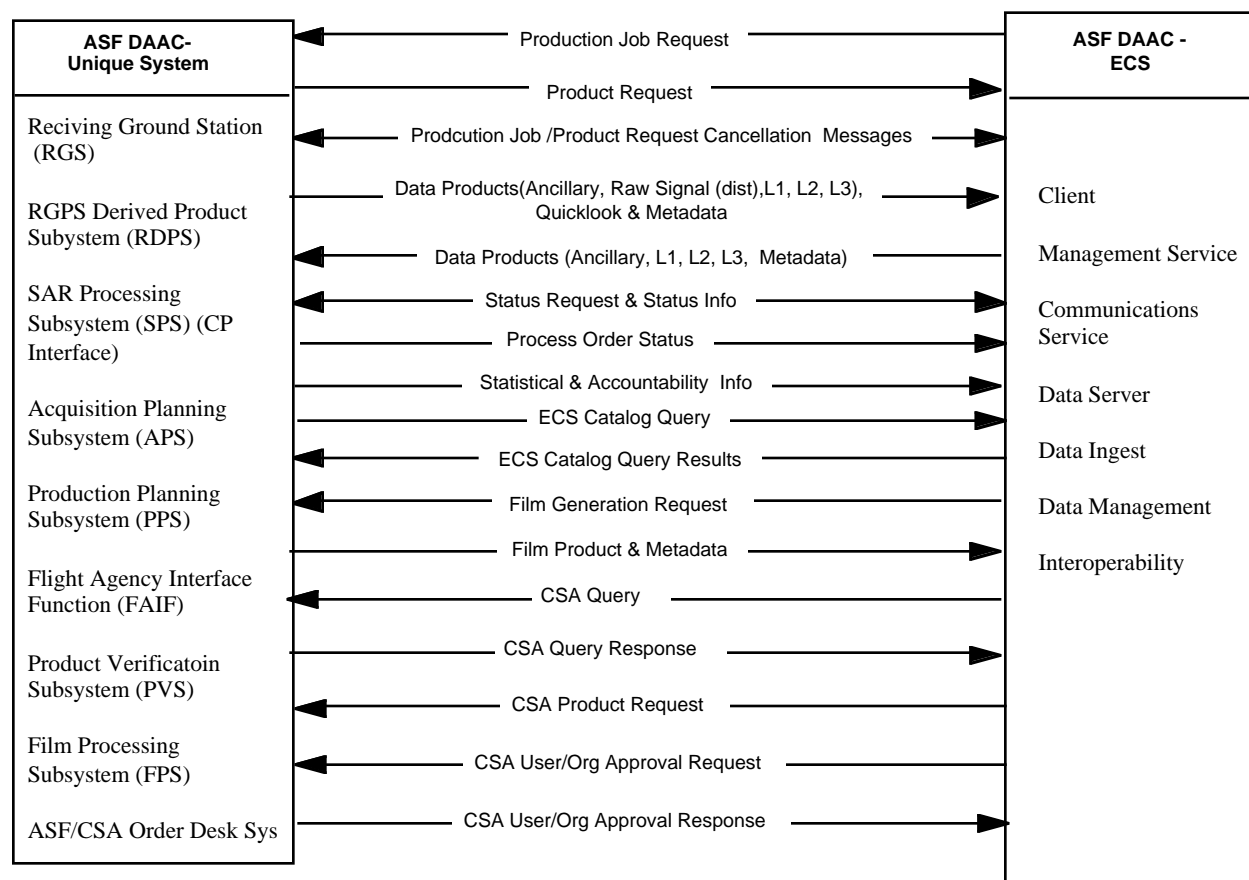

Figure 5-1. ECS ASF DAAC-Unique System Context Diagram

5.1 Production Job Request (ECS -> ASF)

The ECS provides the ASF DAAC-Unique System with Production Job Requests for SAR raw signal data, Level 1 - 3 products and quicklook data.

The Production Job Request is based on Product Request received from users, or ASF DAAC-Unique subsystems. Since ECS maintains the data catalogs for all of ASF's products, it knows whether the products being ordered exist in the archive. If they do, ECS distributes them . If they don't, once ECS has verified that the associated SAR raw signal data exists or can be planned, ECS generates Production Job Requests to forward to the ASF DAAC-Unique System to create the products requested.

This interface is supported by the ECS object class 'PlOnDemandPRNB'. Definition and format for this object class can be found in Release B SDPS Planning Subsystem Design Specification (DID 305).

5.2 Production Job Request Cancellation (ECS -> ASF)

The ECS provides the ASF DAAC-Unique System with a Production Job Request Cancellation in the event a user or an ASF DAAC-Unique subsystem cancels a "user" Product Request.

This interface is supported by the ECS object class 'PlDPR'. Definition and format for this object class can be found in Release B SDPS Planning Subsystem Design Specification (DID 305).

5.3 Product Request (ASF -> ECS)

The ASF DAAC-Unique System provides the ECS a Product Request for SAR raw signal data, Level 1 - 3 Products, Metadata and Ancillary data.

This interface includes Product Requests for any product in the ASF product suite including Level 1 - 3 products, SAR raw signal metadata and ancillary data. Since ECS maintains the catalogs for all of ASF's data products, and maintains the archives for everything except the SAR raw signal data, the ASF DAAC-Unique System submits Product Requests to ECS for the products it needs to perform processing.

This interface is supported by the ECS object class 'DsC1ESDTReferenceCollector'. Definition and format for this object class can be found in Release B SDPS Data Server Subsystem Design Specification (DID 305).

5.4 Product Request Cancellation (ASF -> ECS)

The ASF DAAC-Unique System provides the ECS with a Product Request Cancellation in the event a product can't be filled.

This interface is supported by the ECS object class 'DsC1Request'. Definition and format for this object class can be found in Release B SDPS Data Server Subsystem Design Specification (DID 305).

5.5   Data Products (ASF -> ECS)

The ASF DAAC-Unique System provides the ECS the following:

   a.   Ancillary Data

   b.   SAR raw signal metadata for catalog

   c.   Level 1 - 3 products and associated SAR image metadata

   d.   Quicklook products and associated metadata

   e.   SAR raw signal data (for manual distribution via supplied tape only)

Once the ASF DAAC-Unique System creates a product, it sends all associated data (except SAR raw signal data) back to ECS to be cataloged, archived and/or distributed . This information (products, metadata, etc.) is primarily in response to a Product Request. Raw signal catalog data comes without an associated Product Request. This happens because ECS maintains the catalog of ASF raw signal data, and the ASF DAAC-Unique System provides updates to the catalog as new data is acquired or as signal data tapes are refreshed.

SAR raw signal data is manually delivered via tape to ECS personnel. ECS personnel will ship the tape to the original requester.

5.5.1   Ancillary Data

Ancillary data products are transferred from ASF to ECS by Kftp. The handshake control messages described earlier in this ICD initiate and end this process. The ECS object class 'InSession' supports this interface. Definition and format of 'InSession' can be found in the Release B SDPS Ingest Subsystem Design Specification (DID 305).

Table 5-1 provides the ASF ancillary data products and associated information.

Table 5-1. ASF Ancillary Data (1 of 2)

Product Name	Freq.	File Size (MB)	Format	Source	Remarks
ESA Restituted State Vector	2/day	.046	Binary	FAIF	
ESA Predicted Orbit	2/day	.00068	Binary	FAIF	
ESA Time Correlation	16/day	.000056	Binary	FAIF	
ESA Global Activity Plan	1/month	**TBD**	ASCII	FAIF	Fixed Format
ESA Request Validation	1/day	**TBD**	ASCII	FAIF	Fixed Format
ESA Acquisition Request (RQUS)	4/day	.01	ASCII	APS	Fixed Format
ESA Acquisition Schedule	1/day	.004	ASCII	FAIF	Fixed Format
ESA Acquisition Report	20/day	.048	**TBD**	**TBD**	
ESA Shipment Report	1/month	.0045	**TBD**	**TBD**	
ESA Extracted Data	1/month	.048	**TBD**	**TBD**	
ESA User Request Status	1/day	.0002	ASCII	FAIF	Fixed Format
ESA Medium Copy Order	1/week	.008	ASCII	FAIF	Fixed Format
ESA Medium Release Order	1/week	.00007	ASCII	FAIF	Fixed Format

Table 5-1. ASF Ancillary Data (2 of 2)

Product Name	Freq.	File Size (MB)	Format	Source	Remarks
ESA Unavailability Report	1/day	.0002	ASCII	APS	Fixed Format
ELMF Orbit Data File	1/day	.009	ASCII	FAIF	Fixed Format
OPLN Operations Plan	1/day	.012	ASCII	FAIF	Fixed Format
REQA Quarterly Request Reply	1/6 weeks	.014	ASCII	FAIF	Fixed Format
REQM Request for Data Dump	1/6 weeks	.0078	ASCII	FAIF, APS	Fixed Format
MSGC HDDT Readability Report	1/day	.00015	ASCII	FAIF	Fixed Format
MSGN Satellite Status Info	1/2 weeks	.00016	ASCII	FAIF	Fixed Format
MSGE	1/2 weeks	.0005	ASCII	APS	Fixed Format
REQQ	**1/3 months**	.01	ASCII	APS	Fixed Format
REQW	**1/week**	.01	ASCII	APS	Fixed Format
MSGM	**TBD**	.01	ASCII	APS	Fixed Format
REAC	1/day	.00054	**TBD**	**TBD**	
CATA	1/week	.072	**TBD**	**TBD**	
MSGF	1/month	.00016	**TBD**	**TBD**	
CSA Predicted State Vector	8/day	.0006	ASCII	FAIF	
CSA Definitive State Vector	14/day	.0032	ASCII	FAIF	
CSA Reception Schedule	14/day	.002	ASCII	FAIF	
CSA Calibration Schedule	1/month	.002	ASCII	FAIF	
CSA Reception Request	14/day	.0024	ASCII	FAIF	
CSA Calibration Request	1/month	.002	ASCII	FAIF	
CSA SAR Processing Parameters	1/month	.01	ASCII	FAIF	
CSA Reception Availability Report	4/month	.01	ASCII	APS	Keyword=value
CSA Archive Storage Report	14/day	.0001	**TBD**	**TBD**	
CSA Reception Report	14/day	.0001	**TBD**	**TBD**	
CSA Calibration Report	1/month	.0001	**TBD**	**TBD**	
CSA Calibration Availability Report	1/month	.0001	**TBD**	**TBD**	
McMurdo Request for Availability Response	**TBD**	**TBD**	ASCII	FAIF	ODL - Keyword = value
McMurdo Datatake Msg File	**TBD**	**TBD**	ASCII	FAIF	ODL - Keyword = value
McMurdo Shipment Report	**TBD**	**TBD**	ASCII	FAIF	ODL - Keyword = value
McMurdo Request for Availability	**TBD**	**TBD**	ASCII	FAIF	ODL - Keyword = value
Weekly Operations Schedule	1/day	.01	**TBD**	APS	
Preliminary Activity Plan	1/day	.01	**TBD**	APS	
GHA Stoic File	1/week		**TBD**	FAIF	
GHA Fixes File	1/week		**TBD**	**TBD**	
Calibration Parameter File	1/day	.1	ASCII (ODL)	PVS	
Calibration Report	1/day	.03	ASCII (ODL)	PVS	
PMF Database File	**TBD**	.05	ASCII (ODL)	PVS	
Scan Results Message	**TBD**	**TBD**	**TBD**	SPS	

Table 5-2. SAR Raw Signal Metadata

Parameter	Description	Type/Format (maximum Length in Bytes)	Value
Activity ID			
Satellite ID			
Downlink Orbit ID			
Downlink Segment ID			
Data Direction			
Tape ID			
Tape Series			
Generation			
HDDR ID			
HDDR Type			
Address Data Start			
Address Data Stop			
Time Data Start			
Time Data Stop			
AOS			
LOS			
Orbit Number			
Start Block			
PBK			
HDDT Type			
Status			

5.5.2 SAR Raw Signal Metadata

SAR raw signal metadata is transferred from ASF to ECS by Kftp. The handshake control messages described earlier in this ICD initiate and end this process. The ECS object class 'InSession' supports this interface. Definition and format of 'InSession' can be found in the Release B SDPS Ingest Subsystem Design Specification (DID305).

Table 5-2 provides ASF SAR raw signal metadata and associated information. (**TBR**)

5.5.3 Level 1-3 Products

The native format for the ASF Level 1 - 3 products is CEOS. The ASF DAAC-Unique System provides data to the ECS in HDF-EOS format **(TBR)**. Table 5-3 (reference the Technical Baseline) defines the characteristics of the files transferred from the ASF DAAC-Unique System to the ECS.

The ECS has been sized to provide a temporary archive for the complex data and full resolution images. Due to the large size of these products they are made available to the user for 30 days.

The ECS object class 'CsFtFTPRelB' supports this interface. Definition and format of this object class can be found in the Release B CSMS Communications Subsystem Design Specification (DID 305).

Table 5-3. ASF Products (1 of 2)

ID	Sci. Data Plan ID	Description	Platform	Level	Number of Granule per Day	Archive or 30-Day Temp.	Volume (GB/day)	Format
SAR01	A-6	Complex Data	ERS-1&2	1	19	30-Day Temp.	2.0000	**TBR**
SAR02	A-7	Complex Data	JERS-1	1	19	30-Day Temp.	2.0000	**TBR**
SAR50	A-8	Images (Full Res)	ERS-1&2	1	300	30-Day Temp.	19.5000	**TBR**
SAR51	A-9	Images (Full Res)	JERS-1	1	151	30-Day Temp.	9.7667	**TBR**
SAR03	A-8	Images (Low Res)	ERS-1&2	1	247	Archive	0.2466	**TBR**
SAR04	A-9	Images (Low Res)	JERS-1	1	83	Archive	0.0822	**TBR**
SAR05	A-10	Geocoded Images (Low Res)	ERS-1&2	2	45	Archive	0.0625	**TBR**
SAR06	A-11	Geocoded Images (Low Res)	JERS-1	2	45	Archive	0.0625	**TBR**
SAR07	A-12	Ice Motion Vectors	ERS-1&2	3	6	Archive	0.0003	**TBR**
SAR10	A-46	Ephemeris	ERS-1&2	1	1	Archive	0.0002	**TBR**
SAR11	A-47	Ephemeris	JERS-1	1	1	Archive	0.0001	**TBR**
SAR12	A-21	Standard Beam Complex Data	RADARSAT	1	4	30-Day Temp.	2.0000	**TBR**
SAR13	A-22	Wide Beam Complex Data	RADARSAT	1	3	30-Day Temp.	2.0000	**TBR**
SAR14	A-23	Fine Resolution Complex Data	RADARSAT	1	15	30-Day Temp.	3.0000	**TBR**
SAR15	A-24	Low Incidence Complex Data	RADARSAT	1	6	30-Day Temp.	3.0000	**TBR**
SAR16	A-25	High Incidence Complex Data	RADARSAT	1	6	30-Day Temp.	3.0000	**TBR**
SAR17	A-26	Standard Beam Geocoded Images (Low Res)	RADARSAT	2	45	Archive	0.0625	**TBR**
SAR18	A-27	Wide Beam Geocoded Images (Low Res)	RADARSAT	2	45	Archive	0.0625	**TBR**
SAR19	A-28	Fine Res. Geocoded Images (Low Res)	RADARSAT	2	45	Archive	0.0625	**TBR**
SAR20	A-29	Low Incidence Geocoded Images (Low Res)	RADARSAT	2	45	Archive	0.0625	**TBR**
SAR21	A-30	High Incidence Geocoded Images (Low Res)	RADARSAT	2	45	Archive	0.0625	**TBR**
SAR22	A-31	SCANSAR Geocoded Images (Low Res)	RADARSAT	2	45	Archive	0.0625	**TBR**
SAR23	A-32	Standard Beam Images (Low Res)	RADARSAT	1	63	Archive	0.0630	**TBR**
SAR24	A-33	Wide Beam Images (Low Res)	RADARSAT	1	3	Archive	0.0014	**TBR**
SAR25	A-34	Fine Resolution Images (Low Res)	RADARSAT	1	6	Archive	0.0055	**TBR**
SAR26	A-35	Low Incidence Images (Low Res)	RADARSAT	1	6	Archive	0.0110	**TBR**
SAR27	A-36	High Incidence Images(Low Res)	RADARSAT	1	6	Archive	0.0055	**TBR**

Table 5-3. ASF Products (2 of 2)

ID	Sci. Data Plan ID	Description	Platform	Level	Number of Granule per Day	Archive or 30-Day Temp.	Volume (GB/day)	Format
SAR28	A-37	SCANSAR Images (Low Res)	RADARSAT	1	50	Archive	0.1644	**TBR**
SAR29	A-38	SCANSAR Terrain Corrected Images (Low Res)	RADARSAT	3	**TBD**	Archive	TBD	**TBR**
SAR30	A-48	Ephemeris	RADARSAT	1	1	Archive	0.0001	**TBR**
SAR31	A-50	Legrangian Ice Trajectories	RADARSAT	3	1	Archive	0.0082	**TBR**
SAR32	A-51	Ice-Age Histograms: Var. Grid	RADARSAT	3	1	Archive	0.0071	**TBR**
SAR33	A-52	Interpolated Ice-Age Histograms: Variable Grid	RADARSAT	3	1	Archive	0.0044	**TBR**
SAR34	A-53	Area-Age Histograms: Var. Grid	RADARSAT	3	1	Archive	0.0071	**TBR**
SAR35	A-54	Interpolated Area-Age Histograms: Variable Grid	RADARSAT	3	1	Archive	0.0044	**TBR**
SAR36	A-55	Ice Thickness Histograms: Variable Grid	RADARSAT	3	1	Archive	0.0044	**TBR**
SAR37	A-56	Open Water Fraction: Var. Grid	RADARSAT	3	1	Archive	0.0019	**TBR**
SAR38	A-57	Backscatter Histograms: Variable Grid	RADARSAT	3	1	Archive	0.0082	**TBR**
SAR39	A-58	Ice-Age Histogram: 50km Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR40	A-59	Ice Thickness Histogram: 50km Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR41	A-60	Backscatter Histogram: 50km Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR42	A-61	Open Water Fraction: 50km Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR43	A-62	Eulerian Ice Motion: Coarse	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR44	A-63	Eulerian Ice Motion: Fine	RADARSAT	3	1	Archive	0.0039	**TBR**
SAR45	A-64	Melt Onset/Freeze Up: Var Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR46	A-65	Melt Onset/Freeze Up: Fixed Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR47	A-66	Meteorological Data	RADARSAT	3	1	Archive	0.0022	**TBR**
SAR48	A-67	Cell Connectivity: Var Grid	RADARSAT	3	1	Archive	0.0001	**TBR**
SAR49	A-68	Antarctic Maps	RADARSAT	3	TBD	Archive	TBD	**TBR**
SAR52	A-32	Standard Beam Images (Full Res)	RADARSAT	1	117	30-Day Temp.	7.8000	**TBR**
SAR53	A-33	Wide Beam Images (Full Res)	RADARSAT	1	4	30-Day Temp.	0.1167	**TBR**
SAR54	A-34	Fine Resolution Images (Full Res)	RADARSAT	1	32	30-Day Temp.	2.0333	**TBR**
SAR55	A-35	Low Incidence Images (Full Res)	RADARSAT	1	5	30-Day Temp.	0.7000	**TBR**
SAR56	A-36	High Incidence Images(Full Res)	RADARSAT	1	8	30-Day Temp.	0.4667	**TBR**
SAR56	A-37	SCANSAR Images (Full Res)	RADARSAT	1	70	30-Day Temp.	14.4000	**TBR**

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5.5.4 SAR Image Metadata

Table 5-4 provides ASF SAR image metadata and associated information. (**TBR**)

The ECS object class 'CsFtFTPRelB' supports this interface. Definition and format of this object class can be found in the Release B CSMS Communications Subsystem Design Specification (DID305).

Table 5-4. SAR Image Metadata

Parameter	Description	Type/Format (maximum Length in Bytes)	Value
Frame			
Center Time (Frame)			
Coordinates			
Tape ID			
Start Block Address			
Stop Block Address			
Status			

5.5.5 Quicklook Products and Associated Metadata

TBD

5.6 Data Products (ECS -> ASF)

In response to the Product Requests, the required input data products are sent to a ASF DAAC-Unique Subsystem to create the products requested by the user or another ASF DAAC-Unique Subsystem.

The ECS provides the ASF DAAC-Unique System with the following products.

    a. SAR raw signal metadata

    b. Level 1 - 3 products and associated metadata

    c. Ancillary data and associated metadata

The ECS object class 'CsFtFTPRelB' supports this interface. Definition and format of this object class can be found in the Release B CSMS Communications Subsystem Design Specification (DID305).

5.7 Status Request and Status (ASF <-> ECS)

The ASF DAAC-Unique System may initiate Status Requests to ECS to check the status of requests it has made of ECS. This interface also includes the Status replies that are sent between ECS and the ASF DAAC-Unique System.

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This interface will be supported by the ECS object class 'EcAgManager'. Definition and format of this object can be found in Release B CSMS System Management Subsystem Design Specification (DID 305).

5.8   Process Order Status (ASF -> ECS)

ECS performs order management functions for all orders for ASF products. To accomplish this, the ASF DAAC-Unique System sends processing status state changes as they happen.

This interface will be supported by the ECS object class 'EcAgManager'. Definition and format of this object can be found in Release B CSMS System Management Subsystem Design Specification (DID 305).

5.9   Statistical and Accountability Information (ASF -> ECS)

The ASF DAAC-Unique System provides the ECS with statistical and accountability information for inclusion in the ECS-provided status reports.

 ECS reports on statistical and accountability data from the subsystems it fields to the DAACs. In addition, ECS reports on subsystems for the ASF DAAC-Unique System. The ASF provides this information to ECS via the ECS object class 'EcAgManager'. Definition and format of this object can be found in Release B CSMS System Management Subsystem Design Specification (DID 305).

The amount of data is **TBD**.

5.10 ECS Catalog Query and ECS Catalog Query Results (ASF <-> ECS)

The ASF DAAC-Unique Systems queries the ECS catalog to obtain metadata about SAR raw signal data, e.g., tape number. The ASF DAAC-Unique RGPS also queries the catalog for planning information.

The interface for catalog query is supported by the ECS object class 'DsC1ESDTReferenceCollector'. The interface for catalog query results is supported by the ECS object class 'DsC1Request'. Definitions and formats for these object classes can be found in Release B SDPS Data Server Subsystem Design Specification (DID 305).

5.11 Film Generation Request (ECS -> ASF)

The ECS provides the ASF DAAC-Unique System with a Film Generation Request.

Many ASF users request film hardcopies of ASF's data products. The ASF DAAC-Unique System creates film products as a DAAC-Unique System function. ECS provide users the capability to order these film products, and passes this request to ASF DAAC-Unique System.

This interface is supported by the ECS object class 'DsC1ESDTReferenceCollector'. Definition and format for this object class can be found in Release B SDPS Data Server Subsystem Design Specification (DID 305).

5.12 Film Product Metadata (ASF -> ECS)

The ASF DAAC-Unique System provides the ECS with film product metadata for inclusion into the ECS catalog.

Once the film products have been created, the products and their associated metadata are sent to ECS. The metadata is cataloged by ECS so that a record of existing film negatives is maintained.

The ECS object class 'CsFtFTPRelB' supports this interface. Definition and format of this object class can be found in the Release B CSMS Communications Subsystem Design Specification (DID 305).

Film product metadata format and content are **TBD**.

5.13 Film Product Distribution (ASF -> ECS)

The ASF ECS operations staff provides the manual distribution of film products.

5.14 CSA Query (ECS -> ASF)

The ECS provides one-way interoperability with the RADARSAT CSA catalog.

This interface supports user queries of the CSA catalog through the CSA provided Order Desk System (ODSys)at the ASF **(TBR)**. The queries are for all supported data in the data pyramid - i.e. product inventories, Guide-type information, ancillary data, metadata, status information, etc. (**TBR**)

Interface format and content **TBS**.

5.15 CSA Query Response (ASF -> ECS)

The CSA provides the ECS a response to the CSA query via the ODSys (**TBR**).

Interface format and content **TBS**.

5.16 CSA Product Request (ECS -> ASF)

The ECS provides the ASF DAAC-Unique System with a CSA Product Request for RADARSAT data that is not in the ECS archive. The CSA Product Request is sent to the CSA Catalog via the ODSys **(TBR)**.

The RADARSAT user requests frame(s) of data through ECS. The ASF DAAC-Unique System provided tool converts the users request for data 'frames' into CSA's 'swath' unit of measure before placing the order**.** The data being ordered may exist at a RADARSAT ground receiving site, or it can be data to be collected in the future.

Once the raw data is delivered to the ASF DAAC-Unique System the ECS gets the metadata for the raw signal data and associates it with the initial user request (subscription) **(TBR)**. ECS creates the necessary Production Job Request(s) for the ASF DAAC-Unique System to create the product(s) that the user ordered. Once created, the product(s) are sent to ECS to be delivered to the user.

Interface format and content **TBS**.

5.17 RADARSAT User/Organization Approval Request (ECS -> ASF)

The ECS provides the CSA with RADARSAT User/Organization Approval Request via the ODSys **(TBR)**.

All new United States ECS users and organizational requests for approval to use RADARSAT data are sent through ECS to a CSA supplied Order Desk at ASF **(TBR)** and on to CSA. The approval process is done by the ASF (who gets the requests information from CSA), and are then implemented through ECS.

The ECS object class 'CsEmMailRelA' supports this interface. Definition and format of this object class can be found in the Release B CSMS Communications Subsystem Design Specification (DID305).

5.18 RADARSAT User/Organization Approval Response (ASF -> ECS)

The ASF DAAC-Unique System provides the ECS with a RADARSAT User/Organization Approval Response to the CSA Catalog via the ODSys.

Once the ASF has approved or denied a request, the response is sent back to the CSA via the order desk **(TBR)** . CSA sends this information back to the ECS user through ECS.

The ECS object class 'CsEmMailRelA' supports this interface. Definition and format of this object class can be found in the Release B CSMS Communications Subsystem Design Specification (DID305).

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Appendix A.
Work-off Plan for Release B ECS – ASF DAAC ICD

ICD Issue #	ICD Para. #	Issue Priority *	ICD Issue Type - Description	Work-off Plan Task(s)	Projected Resolution Date	Risk Assessment**
1	4.3.5	A	Physical media needs to be reviewed	ECS work with ASF to identify correct physical media	5/96 (Bridge Analysis Results Available)	1. none 2. none, physical media already supported by ECS
2	5.5.1	A	Ancillary Data information missing from table	Have ASF provide	8/96 (5/96 Bridge Analysis Results Available)	1. None 2. Potential impact to schedule to support the ancillary data for ASF at Rel B
3	5.5.2 to 5.5.3	A	Metadata content needs to be mapped to core model and necessary information provided by ASF	ECS to work with ASF to complete	6/96	1. Minimum 2. Potential impact to schedule for ASF at Rel B if additional metadata is required by ECS
4	5.5.4	A	Level 1-3 Product format not resolved and missing information from product table	ECS to work with ASF to resolve format issue, ASF to provide missing information	8/96 (5/96 Bridge Analysis Results Available)	1. Minimum 2. Potential impact to schedule for ASF at Rel B
5	5.5.5	A	Quicklook Products and Associated Metadata needs to be defined.	ASF to provide	8/96 (5/96 Bridge Analysis Results Available)	1. Minimum 2. Potential impact to schedule for ASF at Rel B
6	5.9	B	Amount of Accountability and Statistical data unknown	ASF to provide	8/96 (5/96 Bridge Analysis Results Available)	1 & 2. None, if info provided by ASF is compatible with interface and is acceptable volumes of accountability and statistical traffic

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ICD Issue #	ICD Para. #	Issue Priority *	ICD Issue Type - Description	Work-off Plan Task(s)	Projected Resolution Date	Risk Assessment**
7	5.11 to 5.16	A	Film Orders and metadata, and CSA interfaces not completely defined, ASF required support not specified in core system	ECS started effort to work the issues, ECS and ASF will work jointly	8/96 (5/96 Bridge Analysis Results Available)	1 & 2. Potential impact if interfaces do not match API specification
8		A	Ops Concepts between JPL developed ASF system (which ECS is to interface with at ASF) and ECS differ	Part of ECS effort noted above	8/96 (5/96 Bridge Analysis Results Available)	1. Major, CDR design may not be able to support 2. Major, may not be containable in Rel B schedule
9		A	Not all ASF required functions are currently within ECS baseline, e.g., DAR support	Part of ECS effort noted above	8/96 (5/96 Bridge Analysis Results Available)	1. Major, CDR design may not be able to support 2. Major, may not be containable in Rel B schedule

* Issue Priority Definition:

      A = Design impact; e.g., unresolved interface.

      B = Minimal design impact; e.g., content or format of a specific field unresolved.

      C = No design impact - administrative detail; e.g., reference document # not available.

** Risk Assessment Definition:

      1 - Risk if issue is not resolved by CDR

      2 - Risk if issues is not resolved by projected resolution date

Abbreviations and Acronyms

ACL   Access Control List

AOS   Acquisition of Signal

API   Application Programmer Interface

APS   Aquisition Planning System

ASF   Alaska SAR (Synthetic Aperture Radar) Facility

CATA   Catalog Data

CCB   Configuration Control Board

CCR   Configuration Change Request

CDR   Critical Design Review

CDRL   Contract Data Requirements List

CEOS   Committee on Earth Observation Satellites

CSMS   Communications and System Management Segment

CSA   Canadian Space Agency

DAA   Data Availability Acknowledgment

DAAC   Distributed Active Archive Center

DAN   Data Availability Notice

DCE   Distributed Computing Environment

DCN   Document Change Notice

DDA   Data Delivery Acknowledgment

DDN   Data Delivery Notice

ECS   EOSDIS Core System

EOS   Earth Observing System

EOSDIS   EOS Data and Information System

ESA   European Space Agency

ESDIS   Earth Science Data and Information System

ESN   EOSDIS Science Network (ECS)

FAIF	Flight Agency Interface Function
FDDI	Fiber Distributed Data Interface
FTP	File Transfer Protocol
GHA	Greenwich Hour Angle
GRIB	GRid In Binary
HC	Host Controller
HDDR	High Data Rate Recorder
HDDT	High Density Digital Tape
HDF	Hierarchical Data Format
I&T	integration and test
I/F	interface
ICD	Interface Control Document
ID	Identification
IETF	Internet Engineering Task Force
IP	Internet Protocol
IR-1	Interim release -1
IRD	Interface Requirements Document
JERS	Japanese Space Agency
Kftp	Kerberos File Transfer Protocol
LAN	Local Area Network
LOS	Loss of Signal
MB	Megabyte (10^6 bytes)
MSGF	Station Status Info
MSGM	HDDT Shipment Report
N/A	Not Applicable
NMC	National Meteorological Center
NOAA	National Oceanic and Atmospheric Administration
ODL	Object Description Language
OODCE	Object Oriented Distributed Computing Environment

ODSys	Order Desk System
PMDR	Physical Media Delivery Record
PMF	Product Metadata File
PPS	Production Planning System
PVL	Parameter-Value Language
PVS	Product Verification System
REAC	Acquisition Result
REQQ	Operation Request
REQW	Weekly Request
RGS	Receiving Ground Station
RIP	Routing Information Protocol
RPC	Remote Procedure Call
SAR	Synthetic Aperture Radar
SDPF	Sensor Data Processing Facility
SDPS	Science Data Processing Segment
SFDU	Standard Formatted Data Unit
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SPS	SAR Processing System
SRRD	Raw Data Shipment Report
STGS	Station Status Info
TBD	To Be Determined
TBR	To Be Reviewed, To Be Resolved
TBS	To Be Supplied
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
V0	Version 0
V1	Version 1

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